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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/092,047	03/04/2002	Sashikanth Chandrasekaran	50277-1776	9683

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EXAMINER	
CORRIELUS, JEAN M	

ART UNIT	PAPER NUMBER
2162	

DATE MAILED: 03/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/092,047	CHANDRASEKARAN ET AL.	
	Examiner	Art Unit	
	Jean M Corrielus	2162	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 September 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) *5-14,16-18,23-32 and 34-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *16-18 and 34-36* is/are allowed.

6)☒ Claim(s) *5-14 and 23-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to restriction requirement filed on September 24, 2004, in which claims 1-4, 15, 19-22 and 23 were canceled claims 5-14, 16-18, 23-36 are presented for examination.

Information Disclosure Statement

2. The information disclosure statement (IDS) filed on January 28, 2005, January 4, 2005, December 2, 2004, September 23, 2004, July 19, 2004, May 18, 2004, November 17, 2003, October 7, 2003, October 20, 2002 and May 4, 2002 complies with the provisions of M.P.E.P. 609. It has been placed in the application file. The information referred to therein has been considered as to the merits.

Drawings

3. Applicants are required to furnish the formal drawings in response to this office action. No new matter may be introduced in the required drawings. Failure to timely submit a drawing will result in ABANDONMENT of the application.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 12-14 and 30-32 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The limitation "if it is unclear whether a particular version of

a data item has been written to disk" in the claims is vague and indefinite. It is not clear as to how one having ordinary skill in the art would determine whether a particular version of a data item has been written to disk.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 5-7, 9, 23-25 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over IBM technical Disclosure Bulletin (hereinafter "Bull") Article entitled "Memory queue priority mechanism for a RISC processor and Biliris et al., (hereinafter "Biliris") US Patent no. 5,966,706.

As to claims 5 and 23, Bull discloses the claimed "in response to a dirty data item being written to persistent storage (separate queues implicit in the priorization of queued items (see page 320, lines 25-27), removing an entry for said data item from both said single-failure queue and said multiple-failure queue (moving entries from said first queue to said second queue when the dirty data items corresponding to the entries need to be transferred to a node other than said first node (page 320, "snoop copyback and program initiated)"; and in response to a dirty data item being sent to another node of said multiple-node system without first being written to persistent storage, removing an entry for said data item said single failure queue without removing the entry for said data item from said multiple failure queue" (separate queues implicit in the priorization of queued items (see page 320, lines 25-27), and when selecting which data items to

write to persistent storage, given priority to data items that corresponding to entries in said second queue [page 320, lines 28-32] is highest priority). However, Bull does not explicitly disclose a checkpoint and recovery algorithm involving single failure queues and multiple failure queues. On the other hand, Biliris discloses the claimed "in a particular node of a multiple-node system, maintaining both a single-failure queue that indicates where within a recovery log to begin recovery after a failure of said node, and a multiple-failure queue that indicates where within said recovery log to begin recovery after a failure of said node and one or more other nodes in said multiple-node system" (col.9, lines 35-50; col.10, lines 8-12; col.10, lines 66-67; col.11, lines 2-14; col.12, lines 60-67; col.13, lines 3-12).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Bull's reference by providing a checkpoint and recovery algorithm that involve single failure queues and multiple failure queue. One having ordinary skill in the art would have found it motivated to utilize such a modification because that would provide Bull's system the enhanced capability of handling transaction aborts and nodes crashes, while incurring minimal overhead during normal transaction processing.

As to claims 6 and 24, Bull discloses the claimed "sending the dirty data item to another node to allow removal of the entry from said single-failure queue without the other node requesting the dirty data item" (moving entries from said first queue to said second queue when the dirty data items corresponding to the entries need to be transferred to a node other than said first node (page 320, "snoop copyback and program initiated).

As to claims 7 and 25, Biliris discloses the claimed "a single node failure, applying said recovery log beginning at a position in said recovery log associated with the single-failure queue; and after a multiple node failure, applying said recovery log beginning at a position in said recovery log associated with the multiple-failure queue" (col.9, lines 35-50; col.10, lines 8-12; col.10, lines 66-67; col.11, lines 2-14; col.12, lines 60-67; col.13, lines 3-12).

As to claims 9 and 27, discloses the claimed "wherein said single-failure queue and said Multiple failure queue are implemented as two separate queues" (col.9, lines 35-50; col.10, lines 8-12; col.10, lines 66-67; col.11, lines 2-14; col.12, lines 60-67; col.13, lines 3-12).

8. Claims 8 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bull and Biliris as applied to claims 5-7, 9, 23-25 and 27 above, and further in view of Lomet US Patent No. 5,933,838.

As to claims 8 and 26, Bull and Biliris disclose substantially the invention as claimed. In addition, Biliris discloses the claimed "said single-failure queue and said multiple-failure queue are implemented by a single combined queue" (col.9, lines 35-50; col.10, lines 8-12; col.10, lines 66-67; col.11, lines 2-14; col.12, lines 60-67; col.13, lines 3-12). Neither Bull nor Biliris discloses the claimed "marking an entry for said data item in said combined queue without removing the entry for said data item from said combined queue".

On the other hand, Lomet discloses the claimed "marking an entry for said data item in said combined queue without removing the entry for said data item from said combined queue" (col.11, lines 45-54).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Bull and Biliris' combined system by marking an entry for said data item in said combined queue without removing the entry for said data item from said combined queue. One having ordinary skill in the art would have found it motivated to utilize such a modification because that would provide Bull and Biliris' combined system the enhanced capability of ensuring correct recovery of data object.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 12-14 and 30-32 rejected under 35 U.S.C. 102(b) as being anticipated by Peter Triantafillou (hereinafter "Peter") Article entitled "Recovering in Large distributed systems with replicated data".

As to claims 12, 30, Peter discloses the claimed "if it is unclear whether a particular version of a data item has been written to disk, then performing the steps of without attempting to recover said data item, marking dirtied cached versions of said data item that would have been covered if said particular version was written to disk" (page 40, col.2, the X's reference mentions write processing of uncertain data item, and comparison of versions of an uncertain data item in response to a read request); "when a request is made to write one of said dirtied cached versions to disk, determining which version of said data item is already on disk; and "if said particular

version of said data item is already on disk, then not writing said one of said dirtied cached versions to disk" (page 40; col.2, item 1 and 2).

As to claims 13 and 31, discloses the claimed "if said particular version of said data item is not already on disk, then recovering said data item" (page 40; col.2).

As to claims 14 and 32, discloses the claimed "if said particular version of said data item is already on disk, then informing nodes that contain said dirtied cached versions of the data item that said dirtied cached versions are covered by a write-to-disk operation" (page 40; col.2).

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

12. Claims 10-11 and 28-29 are rejected under 35 U.S.C. 102(e) as being anticipated by Biliris et al., (hereinafter "Biliris") US Patent no. 5,966,706.

As to claims 10 and 28, Biliris discloses the claimed "determining whether the failure involves only one node; and if the failure involves only said one node, then performing recovery by

applying a recovery log of said node beginning at a first point in the recovery log" (col.9, lines 35-50; col.10, lines 8-12; col.10, lines 66-67; col.11, lines 2-14); and "if the failure involves one or more nodes in addition to said one node, then performing recovery by applying said recovery log of said node beginning at a second point in the recovery log, wherein said first point is different from said second point" (col.12, lines 60-67; col.13, lines 3-12).

As to claims 11 and 29, Biliris discloses the claimed "wherein the first point is determined, at least in part, by which data items that were dirtied by said node reside in caches in other nodes; and the second point is determined, at least in part, by which data items that were dirtied by said node have been persistently stored" (col.9, lines 64-67).

Allowable Subject Matter

7. Claims 16-18 and 34-36 are allowable in light of the prior art made of record.

Reasons for Indicating Allowable Subject Matter

8. The following is an examiner's statement of reasons for allowance: Upon searching a variety of databases, the examiner respectfully submits that "maintaining for each of said multiple caches, a globally dirty checkpoint queue and a locally dirty checkpoint queue, wherein the globally dirty data items associated with entries in the globally dirty checkpoint queue are not retained until covered by write-to-disk operations and maintaining, for each cache, a first checkpoint record for the locally dirty checkpoint queue that indicates a first time, where all change made to data items that are presently dirty in the cache prior to the first time have been recorded on a version of the data item that is on persistent storage" in conjunction with all other

limitations of the dependent and independent claims 16-18 and 34-36, are not taught nor suggested by the prior art of record (PTO-1449 and 892,). Therefore, all pending claims 16-18 and 34-36 are hereby allowed.

Conclusion

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jean M Corrielus whose telephone number is (571) 272-4032. The examiner can normally be reached on 10 hours shift.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Breene can be reached on (571) 272-4107. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jean M Corrielus
Primary Examiner
Art Unit 2162

March 2, 2005